



## Environmental Technology Department

### Focus

The Environmental Restoration Technology Department provides customers with innovative solutions to problems created by environmental hazards at contaminated sites. To meet customer needs, solutions range from components drawn from our lab-wide scientific competency base to complete systems based on our systems engineering experience. We actively seek partnerships with stakeholders who impact usage and commercial suppliers who will deliver services to those markets.

Our lines of business include:

- Environmental Restoration Technology Development  
Our technology development and deployment staff are experienced in moving innovative ideas from the basic/applied research stage to application. We have current projects in the following areas:
  - *Characterization*: Our technology ranges from individual sensors to complete systems providing information about a site including the source, type, mobility, amounts, and spatial distribution of contaminants. Our efforts in this area have resulted in the receipt of R&D 100 awards in past years.
  - *Remediation*: We specialize in the development of innovative remediation technologies which can minimize risks posed by contaminated sites without excavating the waste materials and soils (e.g., *in situ* treatments).
  - *Containment*: Our technology portfolio provides tools that can be used to isolate contaminants while natural or man-made remediation processes completely eliminate the source, or can be used to prevent further migration until remediation can be performed at a later time. We have extensive experience in surface and subsurface, permeable and impermeable, innovative barrier/containment technologies.
  - *Monitoring*: Monitoring follows remediation and/or the installation of containment barriers to verify that contamination has been removed or contained as intended. We develop innovative monitoring technologies to more cost-effectively meet this long-term need.

- Environmental Restoration Field Operations (ERFO)

We perform environmental field operations. Our ERFO Team provides equipment, technical guidance, and field support to cleanup operations for the environmental restoration project at Sandia and to technology development field tests/demonstrations at sites across the United States. We perform groundwater and site assessments, soil and soil gas sampling, earth moving, site restoration actions, data acquisition, and monitoring activities.

- Environmental Restoration Synergistic Activities

We also perform work that is synergistic with our environmental restoration projects. For example, our staff support the development and maintenance of the technology management information system used by the DOE's Environmental Management Office of Science and Technology. This provides a service to our primary customer and provides a better understanding to us of the needs for new technology. We also contribute in a major way to the DoD effort for improvements in environmental fate and transports modeling required to better define chemical signatures emanating from buried landmines and unexploded ordinance. This broadens our knowledge on the movement of a wide variety of environmental contaminants.



*Electrokinetics*



*In Situ Reactive Barrier System*



## Laboratory and Field Capabilities

Our Department has existing assets to support environmental assessments and field operations. These assets include:

- An environmental chemistry lab located in Technical Area I, Building 823.
- Environmental restoration technology field test sites located in Technical Area III including the Alternative Landfill Cover Demonstration (ALCD) and the Landfill Simulation and Monitoring Test Cell.
- A specialized building that serves as the base for our environmental restoration field operations (ERFO). Building 9925 houses our equipment and supplies, includes a high bay area for maintenance and assembly operations, and contains machine shop/welding support equipment need for rapid response to situations arising in the field. Vehicles, environmental sampling equipment, and trailers along with a considerable investment in tools and other specialized equipment that can be mobilized to support field operations across the United States.

## Selected Projects

*Alternative Landfill Cover Demonstration (ALCD):* ALCD is working to provide accepted data on alternatives to existing EPA approved cover systems that will work more effectively and be easier and less expensive to install in arid and semi-arid climates. A side-by-side comparison is being conducted on the following covers: RCRA Subtitle C Clay Cover, Subtitle D Soil Cover, Geosynthetic Clay Layer (GCL) Cover, Capillary Barrier, Anisotropic Barrier, and Evapotranspiration Soil Cover.

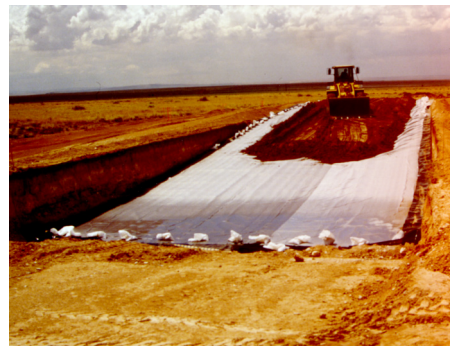
*Barrier Verification and Monitoring System:* SEAttrace™ is the first, real-time, autonomous, quantitative, vadose zone, subsurface barrier assessment system that uses gaseous tracers. This system integrates an automatic, multipoint soil vapor sampling system with a data analysis system using an inverse global optimization code to pinpoint leak locations, sizes, and time leaks started.

*Environmental Impacts to the Chemical Signature Emanating from Buried Landmines and Shallow UXO:* This Department of Defense funded project includes adapting soil physics based simulation models to the near surface soil environment in order to quantify the chemical source term from buried explosives, performing laboratory experiments to measure fundamental transport properties, and conducting laboratory-scale column experiments to validate model improvements.

*In Situ Reactive Barrier Systems:* In an effort to devise a cost efficient technology for remediation of uranium-contaminated ground-water, the DOE Uranium Mill Tailings Remedial Action (UMTRA) Program funded SNL to fabricate a field-scale research project utilizing reactive subsurface barriers at an UMTRA site in Durango, CO. A reactive subsurface barrier is produced by emplacing a reactant material (metallic iron was used in this experiment) in the flow path of the contaminated groundwater. The reactive media then removes and/or transforms the contaminant(s) to regulatory acceptable levels.



*Environmental Measurement-While-Drilling (EMWD) System*



*Alternative Landfill Cover Demonstration (ALCD)*

*Environmental Measurement-While-Drilling System (EMWD):* The EMWD system is a unique site assessment tool with downhole sensors located behind the drill bit. The sensors are linked by a high-speed data transmission system using the SNL cable spool to a computer on the surface. This system is used for real time field screening and decision-making while drilling during site assessment activities.

*Environmental Restoration Project Field Operations:* The environmental restoration field office (ERFO) team provides field support to the cleanup of most of Sandia's legacy sites that require remediation. This included excavation and remediation of unexploded ordinance mounds and classified waste landfills, excavation and reconstruction of a natural arroyo which has been used as a test debris dump and subsequently back filled for a parking lot, assessment of soils and groundwater for site characterization, and evaluation of abandoned mines sites suspected of being used for earlier inappropriate waste disposal.

---

## Sandia National Laboratories • Geoscience and Environment Center

P. O. Box 5800, Albuquerque, NM 87185-0719

Attention: Susan M. Howarth, Environmental Technology Department  
Phone: 505/284-4011 - Fax: 505/844-0543 - e-mail: smhowar@sandia.gov